

(Translation of Office Action Issued in Counterpart Korean Application)

OFFICIAL LETTER

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Application No.10-2001-0035451

Title of the Invention: STRUCTURE OF PIEZOELECTRIC ELEMENT AND
LIQUID DISCHARGE RECORDING HEAD, AND METHOD OF
MANUFACTURE THEREFOR

REASON

The invention as defined in claims 1-60 of the present application is obvious from the documents cited below to those who have skill in the art. Accordingly, the application is not granted under Item 2 of Article 29 of Korean Patent Law.

NOTE

Reference 1: EP0930165

Reference 2: USP5,995,359

Claims 1-4 relate to a structure of piezoelectric element comprising a support substrate and a piezoelectric film. The piezoelectric element has a first layer perovskite construction and a second layer containing zirconium, the layers being stacked through an intermediate layer. The reference 1 discloses an ink jet head provided with a piezoelectric film having first and second layers of perovskite construction and a piezoelectric vibration portion, the piezoelectric film containing lead, titan and zirconium and the first layer not containing zirconium or less than the second layer, and the piezoelectric vibration portion causing ink droplets from an ink discharge port.

As compared with each other, the present invention is different from the reference 1 in that the temperature when the film of the piezoelectric

film is formed is limited and the intermediate layer is added. Accordingly, the invention as defined in claims 1-4 is obvious from the reference 1.

The invention as defined in claims 5-7 is obtained by adding the piezoelectric film construction in claim 1 to a liquid discharge recording head. Accordingly, the invention as defined in these claims is obvious from the reference 1.

Claims 8-23 are dependent claims and claims 8, 9, 12-16 and 19-22 only recite additional features to claim 1. Further, claims 10, 11, 17, 18 and 23 only add usual feature to claim 1. Accordingly, the invention as defined in these claims is obvious from reference 1.

The invention as defined in claims 24 and 25 relates to a method for manufacturing a liquid discharge head provided with a body having a liquid discharge port, an opening and a pressure chamber and a piezoelectric vibration portion provided to close the opening. The reference 1 discloses an ink jet head provided with a piezoelectric film having first and second layers of perovskite construction and a piezoelectric vibration portion, the piezoelectric film containing lead, titan and zirconium and the first layer not containing zirconium or less than the second layer, and the piezoelectric vibration portion causing ink droplets from an ink discharge port. The reference 2 discloses electrical components having a bottom layer, an upper layer and an intermediate layer. Accordingly, the invention of these claims is obvious from the references 1 and 2.

Claim 26 is a dependent claim reciting a sputtering method and a CVD method. However, the reference 1 also discloses the sputtering method and the CVD method.

Claims 27-60 are dependent claims and claims 29, 30, 33-35, 39-46 and 51-60 only recite additional features to claims of the reference 1. Further, claims 27, 28, 31, 32, 36-38 and 47-50 only add usual feature to claims of the reference 1. Accordingly, the invention as defined in these claims is obvious from the reference 1.

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